KODAK PROFESSIONAL ENDURA Metallic Paper

p.o.p. that *pops*

KODAK PROFESSIONAL ENDURA Metallic Paper is a color negative paper with a unique metallic appearance. It is coated on a patented multi-laminate base that provides durable, tear-resistant prints.

This paper is ideal for a variety of portrait/social applications—for example, glamour, wedding, prom, and special-events photography and for many commercial applications. It can be exposed both digitally and optically, providing consistency and efficiency in the lab.

Like other KODAK PROFESSIONAL ENDURA Papers and Materials, ENDURA Metallic Paper features significantly improved image stability. Other improvements include process robustness and a dramatic increase in D-max in digital applications. The new paper is easily distinquished from KODAK PROFESSIONAL Color Metallic Paper by its unique watermark on the back. ENDURA Metallic Paper has a single gray dot under "PAPER", while Color Metallic Paper has two dots separating "PAPER", "PAPIER" and "PAPEL".

ENDURA Metallic Paper is available in a variety of roll and sheet sizes. It can be intermixed with other KODAK PROFESSIONAL Papers in KODAK EKTACOLOR Chemicals for Process RA-4.

FEATURES	BENEFITS
• New emulsion technology for digital and optical performance	• One paper for all exposing devices from digital (CRT, LED) exposing devices to optical enlargers and automatic printers • Excellent latent image keeping from 5 seconds to 24 hours means improved consistency, especially in digital devices • Excellent print quality in both high quality and high productivity modes of bi-directional printers
• Patent-pending dual layer coupler blending technology	• Excellent color accuracy and brightness • Striking prints and flattering portraits • Improved color saturation for blues, cyans and purples
• State-of-the-art image stability	• Improved light stability - over 100 years before noticeable fading in typical home display • Significantly improved dark stability - over 200 years before noticeable fading under most common storage conditions • Superior performance in professional applications creating new standards for image permanence
• Metallic look combined with a smooth glossy surface	• Distinctive, cutting-edge appearance
• Patented high intensity reciprocity characteristics	• Exposure range of 32 stops - from 50 nanoseconds to 10 minutes • Can be used for all types of exposing devices, from optical enlargers and automatic printers to digital exposing devices (CRT, LED, Laser) • Broad print engine applicability for CRT, LED, Laser devices • Optimized text and fringing characteristics in all digital devices
• More robust processing capability in KODAK EKTACOLOR RA Chemicals	• Rapid access and convenient processing with other papers and materials for Process RA-4 • Less sensitive to process chemical activity variations • Reduced sensitivity to process fluctuations caused by: – Image density content (low key/high key) – Inadvertent low level of bleach-fix contamination – Utilization changes – Product mix • More complete paper development for improved consistency
• Reduced developer replenishment rates	• Lower process RA-4 processing costs • Lower environmental impact
• 50% less calcium	• Significantly reduced propensity for calcium buildup • Reduced maintenance and cleaner running paper processors
• Exceptional durability and tear resistance	• Long print life
• Minimum curl with humidity changes	• Improved print appearance and handling
• Pencil writeability on the back	• Convenience in marking prints for identification
• Improved raw stock color—patented technology	• Lighter, more neutral raw stock color for easier dodging and burning • Easier printer setup and focus
• Reduced sensitometric variability	• More consistent quality within an emulsion blend

STORAGE AND HANDLING

Store unprocessed paper at 13°C (55°F) or lower in the original sealed package. High temperatures or high humidity may produce unwanted print quality changes.

To avoid moisture condensation on unexposed paper that has been refrigerated, allow the paper to warm up to room temperature before opening the package. For best results, remove the paper from cold storage the day before you use it, or allow the paper to warm up for the appropriate time from the following table:

Warm-Up Times (Hours) to Reach Room Temperature of 21°C (70°F)			
Size	From a Storage Temperature of		
	-18°C (0°F)	2°C (35°F)	13°C (55°F)
8 x 10-inch (100-sheet box)	4 hours	3 hours	2 hours
16 x 20-inch (50-sheet box)	3 hours	2 hours	2 hours
20 x 24-inch (50-sheet box)	3 hours	2 hours	2 hours
3 1/2-inch x 775-foot roll	8 hours	6 hours	4 hours
8-inch x 575-foot roll	10 hours	7 hours	4 hours
20-inch x 50-foot roll	6 hours	5 hours	3 hours
30-inch x 100-foot roll	8 hours	6 hours	4 hours
40-inch x 100-foot roll	9 hours	7 hours	5 hours

Handle the paper carefully by the edges. The paper is packaged with the emulsion side of all sheets facing in the same direction. For complete light and moisture protection, use the inner bag *and* the two-part cardboard box to store the paper.

Note: Be sure to use sharpened cutting equipment. The effects of dull cutting blades will be more noticeable with this paper than with traditional papers because of its tear-resistant characteristics.

DARKROOM RECOMMENDATIONS

Handle unprocessed paper in total darkness. Be sure that your darkroom is light tight. Eliminate stray light from enlarger heads, timers, LEDs, etc.

Note: Using a safelight *will* affect your results. If *absolutely necessary*, you can use a safelight equipped with a KODAK 13 Safelight Filter (amber) with a 7 1/2-watt bulb. Keep the safelight at least 1.2 metres (4 feet) from the paper. Keep safelight exposure as short as possible. Run tests to determine that safelight use gives acceptable results for your application.

EXPOSURE

Digital Printing

You can expose KODAK PROFESSIONAL ENDURA Metallic Paper with many types of digital printers. It performs well with the following Kodak digital printers:

- KODAK PROFESSIONAL LED Color Printer
- KODAK PROFESSIONAL LED II Printer 20P/20R
- KODAK PROFESSIONAL Digital Multiprinter
- KODAK PROFESSIONAL Digital Multiprinter II
- KODAK PROFESSIONAL LF CRT Color Printer
- KODAK PROFESSIONAL RP 30 Laser Printer*
- KODAK PROFESSIONAL RR 30 Laser Printer
- KODAK PROFESSIONAL SRP 30 Laser Printer*
- KODAK PROFESSIONAL RP 50 LED Printer

* Calibration routines will become available in June 2003.

Because new digital printers are being developed and introduced rapidly, any comprehensive list of appropriate equipment becomes outdated quickly.

Starting values for Kodak digital printers and other manufacturers' equipment will be added to at **www.kodak.com/go/endura** as they become available. Look for KODAK Publication CIS-241, *Digital Printer Aims for KODAK PROFESSIONAL ENDURA Metallic Paper*, in April 2003.

Device Calibration

Manufacturers of digital printing equipment normally provide specific calibration procedures with their equipment.

Note: The unique reflective characteristics of KODAK PROFESSIONAL ENDURA Metallic Paper may require one or two extra calibration runs.

Optical Printing

Expose KODAK PROFESSIONAL ENDURA Metallic Paper in automatic printers or enlargers equipped with tungsten or tungsten-halogen light sources or photo enlarger lamps. Set up and balance the printer or enlarger according to the manufacturer's instructions.

Do not use fluorescent lamps to expose this paper. Use a heat-absorbing glass to remove infrared radiation. Because voltage changes affect light output and color quality, use a voltage regulator.

Keep negatives and the equipment optical system clean. Mask negatives to eliminate stray light. You can use the white-light or tricolor exposure method.

Printer Setup

KODAK PROFESSIONAL ENDURA Metallic Paper is slightly slower than KODAK PROFESSIONAL PORTRA and SUPRA ENDURA Papers. As a starting point, use the same printing times and include a density series to determine your preferred exposure.

Initial conversion to this paper from KODAK PROFESSIONAL Color Metallic Paper involves rebalancing your printers. Since the green speed is about a 1/2 stop faster than Color Metallic Paper, increase your magenta filtration by approximately 15CC.

White-Light Exposure Method

Control color balance with dichroic filters built into the printer or enlarger, or with KODAK Color Printing (CP) Filters (Acetate) placed between the lamp and the negative. You can use any number of filters between the light source and the negative. If you use cyan filtration, use filters with the suffix "-2," (e.g. "CP10C-2").

1. Start with a filter pack of 60M + 45Y to make a test print.
2. Evaluate the test print under light of the same color and brightness that you will use to display the final print. (See "Viewing.")
3. Judge print density first. If necessary, make another print by adjusting the exposure as recommended in the following table:

If your print is	Do this	OR	Do this
TOO LIGHT	Open the lens aperture to increase the light level		Increase the exposure time
TOO DARK	Close the lens aperture to decrease the light level		Decrease the exposure time

4. Then judge the color balance. You can use the *KODAK Color Print Viewing Filter Kit*, KODAK Publication No. R-25, to evaluate your test print. The kit contains 18 color-print viewing filters and instructions to help you determine filter adjustments for the white-light exposure method.

If your print is	Subtract these filters	OR	Add these filters
CYAN	Magenta + Yellow (Red)		Cyan
MAGENTA	Cyan + Yellow (Green)		Magenta
YELLOW	Magenta + Cyan (Blue)		Yellow

If your print is	Subtract these filters	OR	Add these filters
RED	Cyan		Magenta + Yellow
GREEN	Magenta		Cyan + Yellow
BLUE	Yellow		Cyan + Magenta

5. Remove neutral density from your filter pack. For example, if you determine that a filter pack of 40R + 10Y + 10C will give you a pleasing print:
   a. Convert any primary filters (R, G, B) to their subtractive equivalents (C, M, Y): 40R = 40M + 40Y.
   b. Add filters of the same color: 10Y + 40Y = 50Y.
   c. If the new filter pack has all three subtractive colors, cancel the neutral density by subtracting the smallest density value from all three densities:

10C	40M	50Y		
-10	-10	-10		
	30M	40Y	=	filtration without neutral density

6. Adjust the exposure for the new filter pack. An exposure time that produced a print of satisfactory density may not produce an acceptable density when you change the filter pack. The following table gives filter factors for calculating exposure adjustments when you use KODAK Color Printing (CP) Filters.

Filter Factors for CP Filters			
Filter	**Factor**	**Filter**	**Factor**
05Y	1.1	05R	1.2
10Y	1.1	10R	1.3
20Y	1.1	20R	1.5
30Y	1.1	30R	1.7
40Y	1.1	40R	1.9
50Y	1.1	50R	2.2
05M	1.2	05G	1.1
10M	1.3	10G	1.2
20M	1.5	20G	1.3
30M	1.7	30G	1.4
40M	1.9	40G	1.5
50M	2.1	50G	1.7
05C	1.1	05B	1.1
10C	1.2	10B	1.3
20C	1.3	20B	1.6
30C	1.4	30B	2.0
40C	1.5	40B	2.4
50C	1.6	50B	2.9

Note: The filter factors listed in the table take into account the effects of filter surfaces.

To use the factors, *divide* the old exposure time by the factor for any filter you *remove*. If you add a filter, *multiply* the time by the factor. If you add or remove two or more filters, multiply the individual factors and use the result as your factor. You may need to modify these factors for your equipment.

When you adjust the filtration in equipment that has built-in dichroic filters, any noticeable differences in density

are due to differences in the color density of the print. For example, you have a print with acceptable density, but a magenta balance. When you add magenta filtration to correct the color balance, the print will become too light, so you must use a longer exposure time.

A rule of thumb for magenta dichroic filtration is to change the exposure time by one percent for every unit of change in filtration. For example, if you increase the magenta filtration by 20M, increase the exposure time by 20 percent. Changes in yellow dichroic filtration do not usually affect the apparent print density. If you use cyan dichroic filtration, use the filter factors in the table above as starting points for adjusting exposure.

Tricolor Exposure Method

Use KODAK WRATTEN Gelatin Filters No. 25 (red), No. 99 (green), and No. 47B (blue) to give the paper three separate exposures. Do not move the paper or the enlarger until you have made all three exposures. Typical exposure times for making an enlargement from a normally exposed negative are given in the table below.

Filter	Times for an Aperture Setting of *f*/8* for 8 X 10 Enlargement of a 120 size KODAK PROFESSIONAL PORTRA Film Negative)
Red	0.7 seconds
Green	0.9 seconds
Blue	1.2 seconds

* For an enlarger equipped with a Photo Enlarger Lamp No. 212 or No. 302; the setting may vary with other types of lamps.

Evaluate the test print under light of the same color and brightness that you will use to display the final print. (See “Viewing.”)

Judge the print density first. If necessary, make another print by adjusting the exposure as recommended in the table below:

If your print is	Do this	OR	Do this
TOO LIGHT	Open the lens aperture to increase the light level	OR	Increase all exposure times proportionally
TOO DARK	Close the lens aperture to decrease the light level	OR	Decrease all exposure times proportionally

Then judge color balance:

If your print is	Subtract these filters	OR	Add these filters
CYAN	Red		Blue + Green
MAGENTA	Green		Red + Blue
YELLOW	Blue		Red + Green
RED	Blue + Green		Red
GREEN	Red + Blue		Green
BLUE	Red + Green		Blue

LATENT-IMAGE KEEPING

Under normal conditions, you should not notice shifts in the latent image with keeping times from 5 seconds to 24 hours. Therefore, you do not need to change your printing procedures to compensate for latent-image shifts under normal temperature and handling conditions. (If shifts do occur, minimize them by keeping the interval between exposure and processing as consistent as possible.)

PROCESSING

Use KODAK EKTACOLOR RA Chemicals for Process RA-4, and use KODAK PROFESSIONAL Pro Srips Color Negative Paper Control Strips for Process RA-4 (see "Process Control").

When fully converted to this paper, your developer replenishment rate should be approximately 10% lower than with KODAK PROFESSIONAL PORTRA III and SUPRA III Papers or KODAK PROFESSIONAL Color Metallic Paper. Review your process control charts and make adjustments as needed to stay in control.

Bleach-fix replenishment rates will stay the same for Process RA-4. When using KODAK EKTACOLOR PRIME Bleach-Fix Replenisher, replenishment rates will need to increase.

For detailed information on replenishment rates and processing this paper in continuous or roller-transport processors, see KODAK Publication No. Z-130, *Using KODAK EKTACOLOR RA Chemicals*. For information on processing this paper in trays or rotary-tube and drum processors, see KODAK Publication No. J-39, *Tray, Drum, and Rotary-Tube Processing with KODAK EKTACOLOR RA Chemicals*. Both publications are available through our website at **www.kodak.com/go/photochemicals**.

Do not use drying temperatures above 93°C (200°F) to avoid damaging prints. *Underdrying* can produce tackiness that tends to make paper stick when it is wound into rolls before cutting. *Overdrying* can cause curl and complicate transport in print finishing.

Do not ferrotype this paper-its surface dries to a natural gloss without ferrotyping.

PROCESS CONTROL

To produce high-quality color prints consistently and with a minimum of waste, you need to match your process to a standard for density, color, and contrast each time you process paper. In addition to monitoring process parameters such as solution times, temperature, replenishment rates, solution concentrations, etc., you should regularly run control strips to ensure best results.

KODAK PROFESSIONAL Pro Strips Color Negative Paper Control Strips / for Process RA-4 (CAT 129 8587) are designed specifically for use with KODAK PROFESSIONAL Papers and KODAK PROFESSIONAL Print and Display Materials in professional labs. These control strips are designed to detect process conditions that can degrade the quality of your finished prints. They are better able to track the papers that are processed in professional finishing laboratories.

For more information, see KODAK Publication No. CIS-202, Using KODAK PROFESSIONAL Pro Strips Color Negative Paper Control Strips / for Process RA-4.

SCANNER TOOLS

The KODAK Q-60 Color Input Targets are available on KODAK EKTACHROME Professional Film in both 35 mm and 4 x 5 inch formats and on KODAK EKTACOLOR Paper. Developed primarily for use by prepress houses in the printing industry, this target can also be used by professional photographers, desktop publishers, and in the emerging hybrid imaging area.

The target is designed for use in the commercial and desktop arenas as a comparative control tool to help customers calibrate their input product to the final output. This target maps the gamut of color space that KODAK EKTACHROME Film and EKTACOLOR Paper can reproduce.

When used properly, customers will be able to compare their output—whether it is separations for the printed page and four-color printing, or second-generation originals from a film recorder to the originals. This will help customers optimize the capabilities of their system for color reproduction of an extreme range of color gamut.

Scanner color characterization targets produced in accordance with ANSI IT8.7/1 (transmission) and IT8.7/2 (reflection) Standards (or ISO 12641) are available from Kodak.

The KODAK PROFESSIONAL Q-60 Color Input Target/Q-60R2 is manufactured on KODAK PROFESSIONAL ENDURA Paper, and is likewise identified by a watermark with a single grey dot under PAPER. This target can be used with both the newer ENDURA Papers and older papers. The older Q-60R1 target, which has the same two-dot watermark as the older papers, can be used with the newer papers.

ILLUMINATION FOR EVALUATION OF PRINTS

Evaluation of prints for color and density requires higher illumination levels than those used in normal display conditions. A good average condition is a light source with a color temperature of 5000 K ± 1000, a Color Rendering Index of 85 to 100, and an illuminance of at least 50 footcandles (538 lux). Fluorescent lamps such as cool white deluxe (made by several manufacturers) meet these conditions.

You can also use a mixture of incandescent and fluorescent lamps. For each pair of 40-watt cool white deluxe fluorescent lamps, use a 75-watt frosted, tungsten bulb.

Viewing conditions should meet ANSI Standard PH2.30-1989.

RETOUCHING

If possible, do any required retouching on color negatives before you make prints—especially if you plan to make more than one print from each negative. For information on retouching negatives, see KODAK Publication No. E-71, *Retouching Color Negatives*.

If the negative image is small, you can make corrections much more easily by applying dry or liquid dyes to small or large areas of the enlarged print. Although you'll probably do most retouching with dyes, you may sometimes want to use black lead, colored pencils, or opaque. Because color prints have separate dye layers, you can't use an etching knife to reduce density as you can with black-and-white materials. For information on retouching prints, see KODAK Publication No. E-70, *Retouching Prints on KODAK EKTACOLOR and EKTACHROME Papers*.

POST-PROCESS TREATMENTS

Mounting Prints

You can mount prints with dry mounting tissue. The temperature across the heating platen should be 82 to 93°C (180 to 200°F). Preheat the cover sheet that you use over the face of the print to remove moisture. Apply pressure for 30 seconds, or up to 3 minutes in the case of a thick mount.

Caution

Temperatures above 93°C (200°F) for long peroids of time can cause physical and color changes in prints. Excessive moisture can also cause color shifts. To minimize these changes, mount at the lowest temperature and over the shortest possible time.

Note: Images on KODAK PROFESSIONAL ENDURA Metallic Paper may shift towards a pink balance after heated to excessive temperatures, but will return to normal color balance when completely cooled to room temperature.

You can also use contact-type adhesive or cement for cold-mounting.

For information on lacquering and other post-process treatments, see KODAK Publication No. E-176, *Post-Processing Treatment of Color Prints—Effects on Image Stability*, available through our website at **www.kodak.com/go/professional**.

DISPLAY

KODAK PROFESSIONAL ENDURA Metallic Paper has been formulated to provide improved dye stability and print longevity for prints displayed under typical home lighting conditions (i.e., 120 lux for 12 hours a day) and typical home dark storage conditions (i.e., 20 to 30°C [68 to 73.4°F] and 50% humidity).

Photographic dyes, like all dyes, can change with time and exposure to sunlight, ultraviolet radiation, excessive heat, and high humidity. To help prevent changes in photographic dyes, follow these guidelines:

- Illuminate prints with tungsten light whenever possible.
- Display prints in the lowest light level consistent with your viewing needs.
- If a print is exposed to direct or indirect sunlight or fluorescent light, use an ultraviolet-absorbing filter (such as glass) between the light source and the print.
- If prints are displayed behind glass, maintain a slight separation between the prints and the glass.
- Keep the temperature and humidity as low as possible.
- Use album materials described in KODAK Publication No. E-30, *Storage and Care of KODAK Photographic Materials - Before and After Processing.*

PRINTER CONTROL TOOLS

The following tools are manufactured by Kodak for optimization of printer balance and slope controls of KODAK PROFESSIONAL PORTRA Films printed on KODAK PROFESSIONAL Papers.

Product	Features / Description	CAT No.
KODAK PROFESSIONAL PORTRA Printer Control Negative Set / Size 135	Size 135 Film Includes one of each: Very Under, Under, Normal, Over, Very Over	179 8511
KODAK PROFESSIONAL PORTRA Printer Control Negative - Normal	Size 120 Film Normal	846 0958
KODAK PROFESSIONAL PORTRA Printer Control Negative - Very Under	Size 120 Film Very Under	107 1398
KODAK PROFESSIONAL PORTRA Printer Control Negative - Under	Size 120 Film Under	841 1902
KODAK PROFESSIONAL PORTRA Printer Control Negative - Over	Size 120 Film Over	177 1302
KODAK PROFESSIONAL PORTRA Printer Control Negative - Very Over	Size 120 Film Very Over	144 5741

The following tools are manufactured by Kodak for optimization of printer balance and slope controls of KODAK PROFESSIONAL PORTRA Films printed on KODAK PROFESSIONAL Papers.

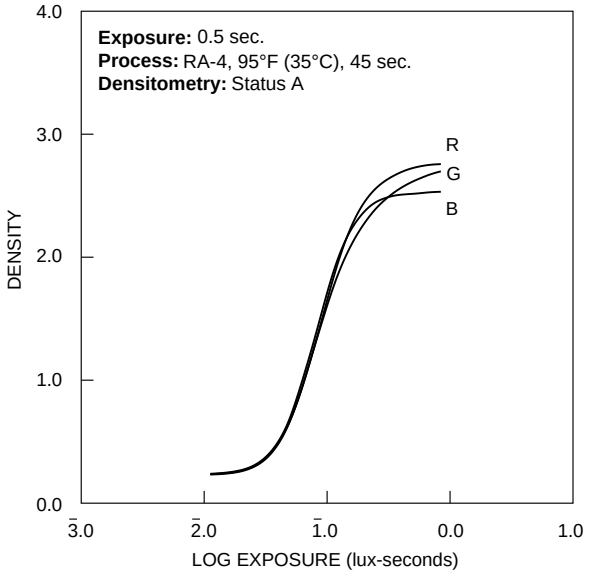
Product	Features / Description	CAT No.
KODAK PROFESSIONAL PORTRA 400BW Printer Control Negative Set / Size 135	Size 135 Film Includes one of each: Very Under, Under, Normal, Over, Very Over	156 8286
KODAK PROFESSIONAL PORTRA 400BW Printer Control Negative Set / Size 120	Size 135 Film Includes one of each: Very Under, Under, Normal, Over, Very Over	114 4419

The following tools are manufactured by Kodak for optimization of printer balance and slope controls of KODAK PROFESSIONAL T400 CN Film printed on KODAK PROFESSIONAL Papers.

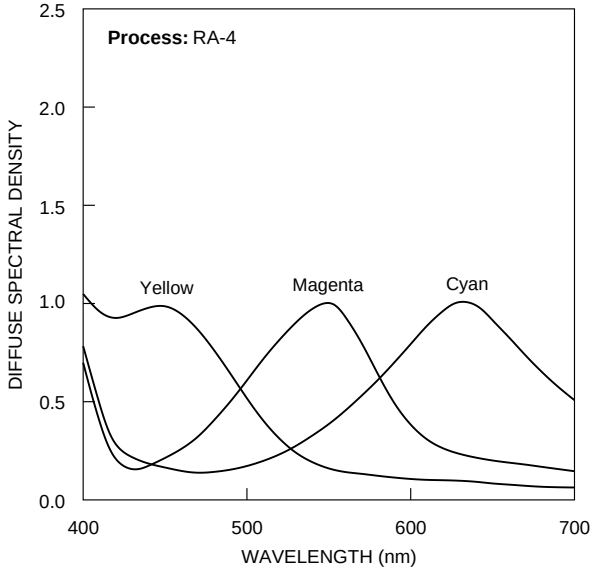
Product	Features / Description	CAT No.
KODAK T400 CN Printer Balancing Kit / Sizes 135 and 120	Sizes 135, 120	865 3552

CURVES

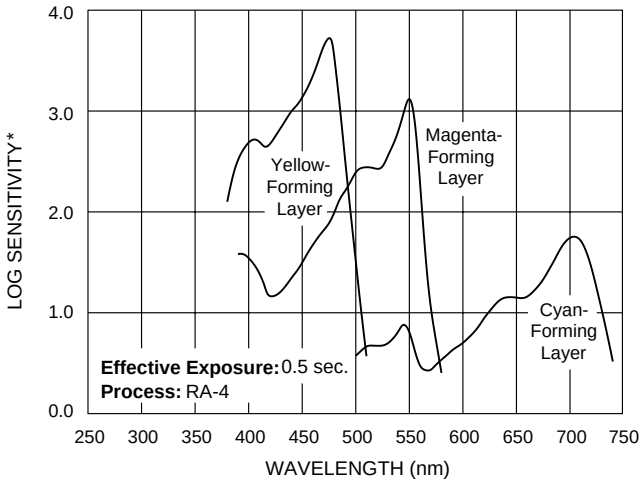
Characteristic Curves



Spectral-Dye-Density Curves



Spectral-Sensitivity Curves



*Sensitivity = reciprocal of exposure (erg/cm^2) required to produce specified density

NOTICE: The sensitometric curves and data in this publication represent product tested under the conditions of exposure and processing specified. They are representative of production coatings, and therefore do not apply directly to a particular box or roll of photographic material. They do not represent standards or specifications that must be met by Eastman Kodak Company. The company reserves the right to change and improve product characteristics at any time.

MORE INFORMATION

Kodak has many publications to assist you with information on Kodak products, equipment, and materials.

Additional information is available on the Kodak website and through the U.S.A./Canada faxback system.

The following publications are available from dealers who sell Kodak products, or you can contact Kodak in your country from more information.

E-30	*Storage and Care of KODAK Photographic Materials—Before and After Processing*
E-70	*Retouching Prints on KODAK EKTACOLOR and EKTACHROME Papers*
E-71	*Retouching Color Negatives*
E-176	*Post-Processing Treatment of Color Prints—Effects on Image Stability*
J-39	*Tray, Drum, and Rotary-Tube Processing with KODAK EKTACOLOR RA Chemicals*
K-4	*How Safe is Your Safelight?*
Z-130	*Using KODAK EKTACOLOR RA Chemicals*

For the latest version of technical support publications for KODAK PROFESSIONAL Products, visit Kodak on-line at:
http://www.kodak.com/go/professional

If you have questions about KODAK PROFESSIONAL Products, call Kodak.
In the U.S.A.:
1-800-242-2424, Ext. 19, Monday–Friday
9 a.m.–7 p.m. (Eastern time)
In Canada:
1-800-465-6325, Monday–Friday
8 a.m.–5 p.m. (Eastern time)

Note: The Kodak materials described in this publication for use with KODAK PROFESSIONAL ENDURA Metallic Paper are available from dealers who supply KODAK PROFESSIONAL Products. You can use other materials, but you may not obtain similar results.

Kodak Professional Division
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